

Solve the problems below using your knowledge of probability. Write fractions in lowest terms.

1. What is the probability of choosing a king from a standard deck of playing cards?
2. What is the probability of choosing a green marble from a jar containing 5 red, 6 green and 4 blue marbles?
3. What is the probability of choosing a marble that is not blue in problem 2?
4. What is the probability of getting an odd number when rolling a single 6-sided die?
5. What is the probability of choosing a jack or a queen from a standard deck of 52 playing cards?
6. What is the probability of landing on an odd number after spinning a spinner with 7 equal sectors numbered 1 through 7?
7. What is the probability of getting a 7 after rolling a single die numbered 1 to 6?
8. What is the probability of choosing a queen, a king or an ace from a standard deck of playing cards?
9. What is the probability of choosing the letter i from the word probability?
10. What is the sample space for choosing a letter from the word probability?

11.6

Geometric Probability

- Goals**
- Find a geometric probability.
 - Use geometric probability to solve real-life problems.

VOCABULARY

Probability

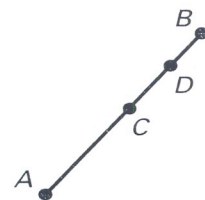
Geometric probability

GEOMETRIC PROBABILITY

Probability and Length

Let \overline{AB} be a segment that contains the segment \overline{CD} . If a point K on \overline{AB} is chosen at random, then the probability that K is on \overline{CD} is

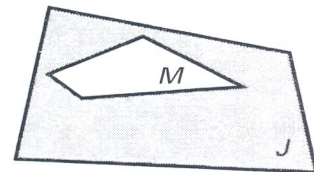
$$P(\text{Point } K \text{ is on } \overline{CD}) = \underline{\hspace{2cm}}$$



Probability and Area

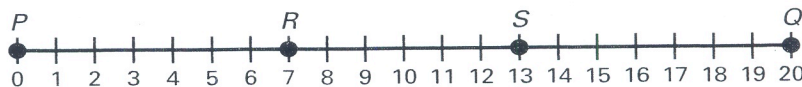
Let J be a region that contains region M . If a point K in J is chosen at random, then the probability that K is in region M is

$$P(\text{Point } K \text{ is in region } M) = \underline{\hspace{2cm}}$$



Example 1 Finding a Geometric Probability

Find the probability that a point chosen at random on \overline{PQ} is on \overline{RS} .



Solution

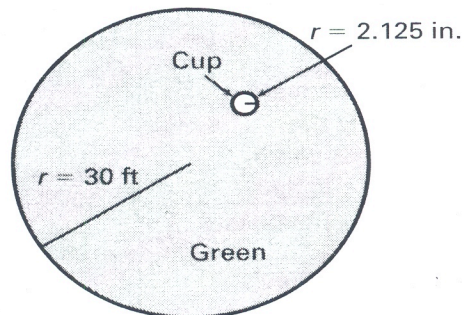
$$P(\text{Point is on } \overline{RS}) = \frac{\text{Length of } \boxed{}}{\text{Length of } \boxed{}} = \frac{}{} = \frac{}{}$$

Answer The probability can be written as $\frac{}{}$, $$, or $\%$.

You can write a probability as a fraction, as a decimal, or as a percent.

Example 2 Using Areas to Find a Geometric Probability

Golf A golf ball is hit and lands on the circular green shown. The ball is equally likely to land on any point on the green. Find the probability that the ball lands in the cup.



Solution

Convert the radius of the green to inches. Then find the ratio of the area of the hole to the area of the golf green.

30 ft = $$ in. Convert feet to inches.

$$P(\text{Ball lands in cup}) = \frac{\text{Area of cup}}{\text{Area of green}}$$

Write ratio.

$$= \frac{}{}$$

Formula for area of circle

$$= \frac{}{}$$

Divide out common factor.

$$\approx \frac{}{}$$

Use a calculator.

Answer The probability that the ball lands in the cup is about $\frac{}{}$.

✔ **Checkpoint** Complete the following exercises.

1. Find the probability that a point chosen at random on \overline{AB} is on \overline{CD} .

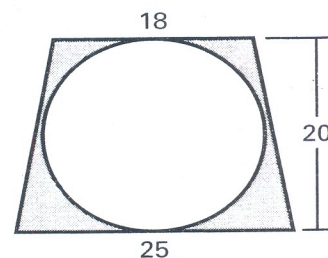


The area of a trapezoid is

$$A = \frac{1}{2}h(b_1 + b_2)$$

where h is the height of the trapezoid and b_1 and b_2 are the lengths of the bases.

2. Find the probability that a randomly chosen point in the figure lies in the shaded region.

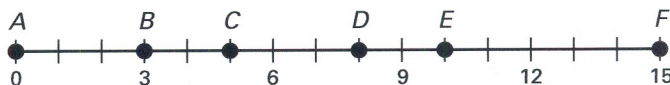


3. You are expecting a visit from a friend anytime between 3:00 P.M. and 5:00 P.M. During this time, you know that you will need to spend 20 minutes cleaning your room. What is the probability that your friend will arrive while you are cleaning your room?



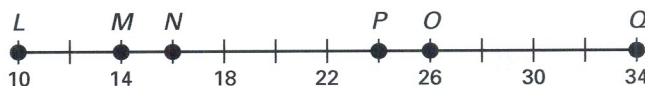
Find the probability that a point K , selected randomly on \overline{AF} , is on the given segment.

1. \overline{AB}
2. \overline{CD}
3. \overline{BD}
4. \overline{CF}

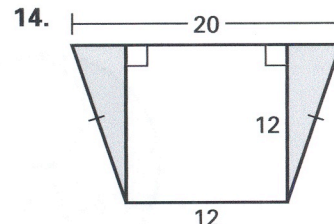
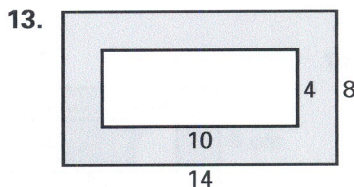
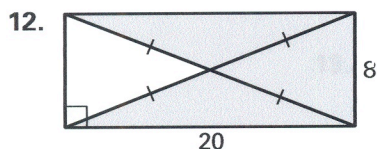
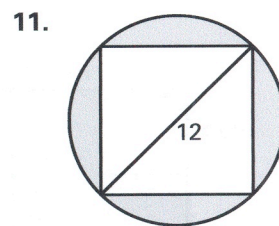
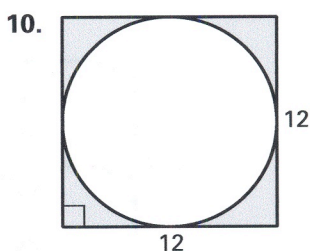
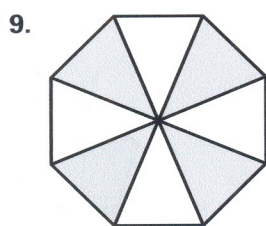


Find the probability that a point X , selected randomly on \overline{LQ} , is on the given segment.

5. \overline{LM}
6. \overline{NP}
7. \overline{OQ}
8. \overline{MQ}

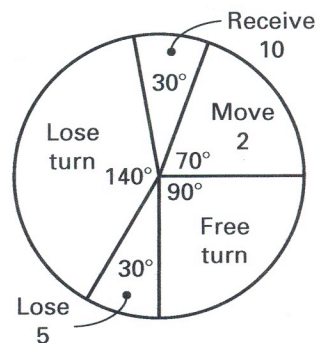


Find the probability that a randomly chosen point in the figure lies in the shaded region.



Find the probability for each outcome on the game spinner shown at the right.

15. Receive a free turn
16. Lose a turn
17. Receive 10 bonus points
18. Move forward 2 spaces
19. Lose 5 points



20. **Fire Drill** The school day begins at 7:30 A.M. and ends at 3:00 P.M. You have math class at 10 A.M. If there is a fire drill at a random time during the day, what is the probability that it begins before math class?